

**REMARKS/ARGUMENTS**

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1 and 90-134 are presently pending in this application, Claims 1 and 90, 92-94, 104, 106-108 having been amended and Claims 122-134 added by way of the present amendment.

In the outstanding Office Action, Claims 1, 90-96, 100-110, 113-115 and 117-121 were rejected under 35 U.S.C. §103(a) as being unpatentable over Seyama et al. (U.S. Patent 5,586,006) in view of Ainslie et al. (U.S. Patent 4,418,857); and Claim 99 was rejected under 35 U.S.C. §103(a) as being unpatentable over Seyama et al. and Ainslie et al., and further in view of JP 58-030175 (hereinafter “JP ‘175”).

First, Applicants wish to thank Examiner Chambliss February 27, 2009 discussion at which time the outstanding issues in this case were addressed. During our discussion, Examiner Chambliss indicated that the after final claim amendment stating “wherein the at least one metal layer is formed in the partial exposed portion of the pad structure after the opening is formed in the solder resist,” will not be entered for purposes of appeal, and thus, the claims on appeal would be those claims filed February 29, 2008. Based on this, Applicants presented amendments and arguments substantially as indicated in this response. While no formal agreement was reached, Examiner Chambliss indicated that amending Claims 1 and 103 to recite “the solder being disposed over at least one metal layer formed only in the partially exposed portion of the pad structure” would overcome the outstanding rejection if filed with an RCE. Examiner Chambliss also indicated that further search and consideration would be needed before making a determination of allowability of the amended claims.

In addition, Applicants respectfully request consideration of the Information Disclosure Statement filed on December 30, 2008.

Claims 90, 92-94, 104, 106-108 have been amended to correct a discovered error in these claims. No new matter is added.

Turning now to the merits, in order to expedite issuance of a patent in this case, Applicants have amended Claims 1 and 103 to clarify the patentable distinctions of the claimed invention over the cited references. Specifically, amended Claim 1 recites a package substrate including an outermost interlayer resin insulating layer, a pad structure formed on the outermost interlayer resin insulating layer and a solder resist formed on the outermost interlayer resin insulating layer and the pad structure, the solder resist having an opening exposing a partially exposed portion of the pad structure. Also recited is a conductive connecting pin configured to establish an electrical connection with another substrate, the conductive connecting pin being secured to the partially exposed portion of the pad structure via a solder, and that the solder is disposed over at least one metal layer formed only in the partially exposed portion of the pad structure. A via hole is formed through the outermost interlayer resin insulating layer and configured to electrically connect the pad structure to at least one conductive circuit formed below the outermost interlayer resin insulating layer, the via hole being positioned directly below the pad structure.

Thus, Claim 1 has been amended to recite "...the solder being disposed over at least one metal layer formed *only* in the partially exposed portion of the pad structure." Claim 103 has been similarly amended. As discussed in the February 27<sup>th</sup> interview, this feature is supported at least by Figures 9, 46, 59 and 75 of the specification. Further, page 82, lines 15-36 of the specification explain that an opening in the solder resist layer is first formed, and then the metal layers are formed therein. Thus, this description also supports that the metal layer is formed "only" in the partially exposed portion of the pad. Therefore, no new matter

is believed to be added by the amendment to Claims 1 and 103. Further, by providing the metal layer formed *only* in the partially exposed portion of the pad structure, the solder is effectively prevented from seeping into an interface between the solder resist and the pad structure but restricted in the exposed portion of the pad structure, thereby allowing the solder resist to remain firmly attached to the pad structure and the conductive connecting pin to be securely held in its place.

The Office Action states that “[i]n regard to Seyama and Ainslie failing to disclose forming at least one metal layer only within the exposed portion, i.e. not entirely over the upper surface of the pad structure. [*sic*] The claims are not so limited in scope to recite only within the exposed portion” and that “[t]herefore, Seyama and Ainslie discloses the claimed invention.” Based on that, the Office Action maintains that the subject matter recited in Claim 1 is obvious over Seyama et al. and Ainslie et al. because “one skilled in the art ... would [have] readily recognized incorporating at least one metal layer between the pin and pad structure of Seyama, since the at least one metal layer would improve the electrical connection while creating a strong bond between the pin and the pad structure as taught by Ainslie.”

However, as discussed in the February 27<sup>th</sup> interview, Seyama et al. Figure 5 shows a conductive pin 34 attached via solder to a pad 32 exposed through a resist. Thus, even if the pad included a metal layer thereon, the metal layer would not be formed “only” in the resist opening. Further, Ainslie et al. simply shows a pad structure having a metal layer formed over its entire upper surface and thus also cannot teach the “only” feature of amended Claims 1 and 103. As discussed in the interview, neither Seyama et al. nor Ainslie et al. teaches or suggests “...the solder being disposed over at least one metal layer formed *only* in the partially exposed portion of the pad structure.”

The JP '175 reference is cited simply for "constriction portion 601 having a diameter, which is smaller than the diameter of the outer portion," and is not believed to correct the deficiencies of Seyama et al. and Ainslie et al. noted above.

Based on the foregoing discussions, Claims 1 and 103 are believed to be allowable. Furthermore, Claims 90-102 and 104-123 depend either Claim 1 or 103 and thus substantially the same reasons set forth above for Claims 1 and 103 are also applicable to these dependent claims. Thus, Claims 90-102 and 104-121 are believed to be allowable as well. Nevertheless, Claims 122 and 123 have been added to recite "wherein at least one metal layer is formed in the partially exposed portion of the pad structure after the opening is formed in the solder resist." That is, Claims 122 and 123 clarify that the "at least one metal layer" is formed in the partially exposed portion of the pad structure after the opening exposing that portion of the pad structure is formed in the solder resist. By forming one or more metal layers in the partially exposed portion of the pad structure after the opening exposing that portion of the pad structure is formed in the solder resist, the metal layer *cannot* be formed entirely over the upper surface of the pad structure, and the solder is effectively prevented from seeping into an interface between the solder resist and the pad structure but restricted in the exposed portion of the pad structure, thereby allowing the solder resist to remain firmly attached to the pad structure and the conductive connecting pin to be securely held in its place.

In contrast, Seyama et al. merely shows a conductive pin 34 attached via solder to a pad 32 exposed through a resist, and Ainslie et al. simply shows a pad structure having a metal layer formed over its entire upper surface. Neither Seyama et al. nor Ainslie et al. teaches or suggests that a metal layer be formed in the partially exposed portion of the pad structure *after the opening is formed in the solder resist such that the metal layer would not extend entirely over the upper surface of the pad structure*, as recited in amended Claims

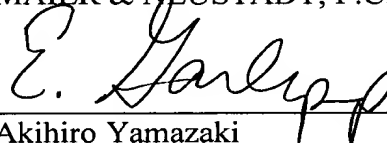
122-123. This provides an additional basis for patentability of these claims over the cited references.

Finally, new claims 124-134 have been added to vary the scope of protection for the claimed invention. These claims are patentable at least for the reasons discussed above with respect to Claim 1.

In view of the amendments and discussions presented above, the present application is believed to be in condition for allowance, and Applicants respectfully request an early and favorable action to the effect.

Respectfully submitted,

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